

AIR COMMAND AND STAFF COLLEGE

AIR UNIVERSITY

The Effectiveness of the Combined Bomber Offensive

By

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A Research Report Submitted to the Faculty

In Partial Fulfillment of the Graduation Requirements

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Maxwell Air Force Base, Alabama

March 2010

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Abstract

Many air power proponents entered World War II with the belief that air power alone would bring Germany to its knees and force capitulation. This was not the official purpose of the Combined Bomber Offensive (CBO). This thought combined with the fact that the CBO did not produce a decisive victory often over shadows the fact that the CBO achieved its objectives and more. The official objective of the CBO was to reduce Germany's means to resist by establishing and exploiting air superiority, thus allowing the invasion of the continent in the spring of 1944. Despite the fact that the CBO did not produce a decisive victory over Germany, it was a decisive factor in the defeat of Germany. In order to understand how the CBO was effective one must examine both the intended and indirect effects of the operation. The intended effects resulted from CBO attacks against the German aircraft industry, transportation industry and infrastructure, and industrial system. However, the effects of these attacks rippled throughout the Third Reich. The unintended consequences of these direct attacks hampered Germany's capabilities to conduct war. The intended effects along with the indirect effects of the attacks best demonstrate how the CBO was effective.

Many air power proponents entered World War II with the belief that air power alone would bring Germany to its knees and force capitulation. History proved this belief incorrect. As a result, many critics claim that the bombing campaign conducted in Europe was ineffective and a waste of important war resources. The basis for these claims is prejudice and lack of knowledge due to historical inaccuracies, studying the campaign from only a single point of view, or ignoring factual data to the contrary. The opinion of a decisive air power victory of Germany was not the driving factor behind the Allied strategic plan.¹ The official objective of the Combined Bomber Offensive (CBO) was to reduce Germany's means to resist by establishing and exploiting air superiority, thus allowing the invasion of the continent in the spring of 1944.² Despite the fact that the CBO did not produce a decisive victory over Germany, it was a decisive factor in the defeat of Germany. In order to understand how the CBO was effective one must examine both the intended and indirect effects of the operation. The intended effects resulted from CBO attacks against the German aircraft industry, transportation industry and infrastructure, and industrial system. However, the effects of these attacks rippled throughout the Third Reich. The unintended consequences of these direct attacks hampered Germany's capabilities to conduct war.³ The intended effects along with the indirect effects of the attacks best demonstrate how the CBO was effective.

The CBO was not a pretty air war like the ones fought today. The CBO used brute force and attrition versus the idealistic refined precision one sees today. This lack of refined precision resulted from unrealistic pre-war assumptions concerning accuracy and bomber survivability, weather, and limited radar technology.⁴ 1.44 million bomber sorties delivered over 2.7 million tons of bombs during the CBO while supported by 2.68 million fighter sorties. At its peak, 28 thousand combat planes and 1.3 million men, in combat commands, fed the operations of the

CBO.⁵ Despite these staggering numbers, there were no clear-cut victories - the CBO's quest for air superiority came about through tough, attrition based warfare. The air war over Europe was a meat grinder, which took its toll on both man and machine. The CBO claimed over 158 thousand American and British aircrew lives and over 40 thousands combat aircraft.⁶ The Allies' economies could handle this type of warfare, but the German economy could not.⁷ These herculean efforts led to air superiority for the Allies, which they exploited to win the war in Europe. The CBO left a path of destruction through Germany that was not just limited to the military targets. The CBO may not have been efficient while it achieved air superiority and attacked the German war industry, but in the end, it proved effective.

While some hoped the CBO would win the war on its own, it was just one initiative in the overall Allies' strategic plan. As previously mentioned, the CBO planned to attack the aircraft industry, transportation industry and infrastructure, and industrial system of Germany. The effects of these attacks showed little promise up through 1943. However, as the war raged on and attrition took its toll on Germany, the Third Reich felt and suffered from the full cumulative effects of the CBO campaign.⁸

The most important target set of the CBO was the Luftwaffe. Destroying the Luftwaffe, whether in the air, on the ground, or during production, developed air superiority that allowed the engagement of other targets sets with greater ease and success. Because of the CBO, Germany faced an imminent invasion in June of 1944 with little prospect of support from the air.⁹ Even though Germany took actions to prevent successful attacks on the aircraft industry, production capacity fell throughout 1944 and 1945. The industry lost one-fifth of its planned production in 1944; by 1945, production loss grew to 59 percent.¹⁰ The German aircraft industry could have produced another 17,000 aircraft in 1944 alone.¹¹ Throughout the CBO, aircraft production only

realized 31 percent of planned production.¹² One reason for the loss in production capacity centers on attacks by the Allies that destroyed much of the special machine tools required for large-scale aircraft production.¹³ The long-range fighter escorts also took part in the destruction of the Luftwaffe. Once their primary mission changed from protecting the bombers to destroying the Luftwaffe, German fighter losses increased while the survival rates of the Allied bombers increased. In May 1944, the Luftwaffe lost 50.4 percent of its single engine fighter force.¹⁴ Because of these attacks on the Luftwaffe on the ground, in the air, and while still in production, the Luftwaffe, which had 815 aircraft available to fly on D-Day, only flew 100 sorties.¹⁵

While the attacks on the Luftwaffe were necessary to further the war effort, the attacks on the industry affected the German war machine in many ways. According to Albert Speers, Minister of Armaments and War production, “The American attacks which followed a definite system assault on industrial targets, were by far the most dangerous, it was in these attacks which the breakdown of the German armaments industry.”¹⁶ The attacks forced the dispersion of factories and the building of underground facilities. Parts were no longer kept at the facilities where the work was preformed. This resulted in the production system becoming more vulnerable to disruptions in the transportation system.¹⁷ Thus, there was a higher demand imposed on the transportation industry with in Germany. The dispersion of industrial facilities forced a move to smaller facilities, which created a higher demand for skilled laborers-a force already stretched too thin.¹⁸ The attacks destroyed special machines and tools, resulting in more hand built items; production slowed even more. Continued bombing disrupted the lives of the industry workers and proved effective in reducing their productivity. Speer further reported that in 1944, actual production of tanks and military trucks was far less than expected (35 to 42 percent respectively) due to the bombing efforts of the Allies.¹⁹ While the previous section addressed how the

CBO affected industry as a whole, examining the attacks against the synthetic oil industry demonstrates the focused and measurable effectiveness of CBO attacks.

German synthetic oil turned out to be a critical component of the war machine and its destruction was vital. The attacks on the oil industry demonstrate the effectiveness of the CBO in reducing a targets capability to operate. As a direct result of attacks on the oil industry, production declined from 316,000 tons per month, at its peak, to 17,000 tons by September 1944.²⁰ Furthermore, attacks during 1944 reduced aviation gas supplies from 175,000 tons in April to 30,000 tons in June and further to 5,000 tons in September.²¹ Albert Speer reported to Hitler in his monthly report, "The enemy has succeeded in increasing our losses of aviation gasoline up to 90 percent by June 22d [1944]. Only through speedy recovery of damaged plants has it been possible to regain partly some of the terrible losses."²² The Leuna synthetic oil plant was the largest plant in the Reich, and the CBO rendered it completely ineffective for production. Bomber attacks from May through December 1944 resulted in an average production of only nine percent of its total capacity.²³ The attacks on Leuna consisted of 6,552 bomber sorties and 18,328 tons of bombs dropped; the attacks were effective, but not necessarily efficient.²⁴ As stated earlier, the Germans had 815 fighters available to fly on D-Day, but only flew 100 sorties-this was due to a lack of oil and gas.²⁵ The large number of weapons employed and concentrated on a single target set, synthetic oil production devastated the German oil industry to a point where it could no longer effectively support the war effort.²⁶

The CBO always included the attacks on the military vehicle portion of the German transportation industry; however, Allied leaders later added the rail and waterways systems, also known as the transportation plan.²⁷ Just as with the oil industry, the CBO effectively dismantled all facets of the transportation industry. The end goals of the transportation plan included shredding the German's rail system, mitigating the use of the waterways, and reducing the production of military vehicles. The attacks on the rail system included marshalling yards, bridges, rail-lines, and train movements.²⁸ By December 1944, Bomber Command had reduced

rail traffic by 50 percent.²⁹ CBO attacks on marshalling yards reduced freight car loading from 900,000 freight cars per week in April 1944, to 214,000 per week in December 1944.³⁰ Additionally, according to the United States Strategic Bombing Survey, “it reduced war production in all categories and made it difficult to move what was produced to the front. The attack also limited the tactical mobility of the German army.”³¹ These attacks forced the German units into long tiresome road marches as a means to move forces. Waterways were a critical partner to the rail system; the waterway system carried 21-26 percent of all German freight.³² The CBO attacked the Dortmund-Ems and Mittelland canals on 23 September 1944 and stopped all water traffic from the Ruhr to the north coast and central Germany.³³ These disrupted supply lines and prevented crucial parts from arriving to finish aircraft engines.³⁴ The last node to hinder German mobility was the military vehicle industry. Attacks from Bomber Command proved devastating. The CBO focused attacks against three main plants that produced trucks for the German war effort.³⁵ A single raid on 6 Aug 1944 against the Opel truck plant completely knocked the plant out for remainder of war.³⁶ Albert Speer’s figures showed a loss of 42 and 35 percent for output of military trucks and armored vehicles respectively during 1944.³⁷ The CBO reduced and mitigated Germany’s ability to move supplies and troops throughout the theater.

Many critics argue that the CBO was not effective because production generally increased throughout the war. This is partially correct; but when examined in the proper context, this increase in production does not disprove the effectiveness of the CBO. It is fact that German production did increase through the war; the German industries did not start the war operating at 100 percent capacity. However, the CBO prevented them from reaching max capacity.³⁸ German industry did not really start to mobilize for war until the German army suffered defeat in Moscow.³⁹ The CBO attacks on the industries, which caused dispersion of resources, hampered

the efforts of the German industry to expand and mobilize. There are several examples of this stifled growth. In 1943, Germany produced 24,807 aircraft and in 1944, it produced 39,807 aircraft. However, Germany planned to produce 80,000 aircraft in 1944, but could not due to bombing efforts.⁴⁰ In September 1944, fighter production was only 45 percent of pre-CBO production capacity.⁴¹ Therefore, Germany only increased production because it did not mobilize the industries for war until late in the war, and by then the CBO created a ceiling on the growth. The 'CBO ceiling' prevented Germany from surviving the attrition-based warfare they were engaged in.

The results of the intended effects are convincing on their own. However, indirect effects best demonstrate the true effectiveness the CBO had against the Third Reich. The indirect effects of the CBO included extreme strain on the economy, catastrophic attrition throughout the Luftwaffe, mitigating other industries production, and diversion of resources from the frontlines.

As stated earlier the German economy did not attempt mobilization to support the war effort until the Soviets defeated them near Moscow. By the time they tried to mobilize, the attacks of the CBO had already suppressed it. According to Albert Speer, plans for aircraft production were curtailed to match the reduced economic capacity, which resulted from CBO attacks.⁴² The attacks on the railways and waterways devastated the coal industry and the German economy operated on coal.⁴³ In March 1945, Speer reported to Hitler, "The German economy is heading for inevitable collapse within 4-8 weeks."⁴⁴ The defeat of the Third Reich was inevitable without the support of the economy.

Allied air planners never considered the largest indirect effect against the Luftwaffe during their planning. The CBO caused large-scale attrition of not just aircraft, but German pilots as well. An aircraft without a pilot is useless during war. Long-range escorts caused devastating attrition among the trained German pilots during escort duties, which directly and indirectly

contributed to air superiority over Germany.⁴⁵ Fighter pilot attrition in the Luftwaffe reached 90 percent. In May 1944, The Luftwaffe lost 489-trained pilots, while the training center only produced 396 new pilots. These losses accounted for the loss of 25 percent of the Luftwaffe's BF-109 and FW-190 pilots.⁴⁶ High attrition rates forced the curtailment of the Luftwaffe's pilot training programs. Pilots underwent shorter training programs and flew fewer hours to try to hurry them into operational units. German pilots only received 60 hours in operation aircraft versus the RAF and USAAF's 225 hours.⁴⁷ Pilots undergoing training received 50 percent fewer hours by mid 1944 than they did in 1939 through 1942.⁴⁸ Not only did German pilots lose out of valuable flight hours, they also lost many experienced instructors; training units had to release over 80 instructors to fill empty frontline cockpits.⁴⁹ Less hours combined with lower quality instruction resulted in pilots flying in combat before they could become effective. This resulted in even higher attrition rates. These inadequate pilots contributed to the fact that in a five-month period during 1944 the Luftwaffe lost 100 percent of its day fighter force.⁵⁰

With air superiority established over Germany, the CBO unleashed attacks that destroyed the oil industry. However, the demise of the oil industry produced secondary effects throughout other industries such as nitrogen, methanol, and synthetic rubber.⁵¹ Two plants, which relied on synthetic oil to run, produced 60 and 40 percent of Germany's nitrogen and methanol respectively.⁵² Before 1944, the industry produced 75,000 tons of nitrogen per month; due to lack of synthetic oil, production fell to less than 20,000 tons per month by the end of 1944. Shells used nitrogen as an explosive and the German agriculture industry used nitrogen as well. However, the allocation for agriculture use dropped from 54 percent during 1943 through 1944 to zero during 1944.⁵³ Despite the reallocation from the agriculture, industry supplies for explosives still ran out. Anti aircraft shells contained partial fills of explosives all fronts suffered ammunition shortages.⁵⁴ Methanol was another chemical used for high explosives, mainly TNT and hexogen. Production shortfalls resulted initially in reduced supplies to principal customers. Later the industry abandoned the use of hexogen all together.⁵⁵ The shortfalls in both nitrogen and methanol resulted in sudden drops in explosives across the Reich.⁵⁶

Along with nitrogen and methanol production, the synthetic rubber industry depended on the oil industry. The effects of the attacks on the oil industry rippled through the synthetic rubber industry as well. The Reich depended on four different plants to provide rubber for the war effort. Each of the plants operated on synthetic oil from a plant on the Ruhr. At its peak, the rubber industry produced 2,000 tons a month, but that production dropped to one-sixth that as a result of the attacks on oil.⁵⁷ Attacks on the oil industry were not the only targets to produce indirect effects in other industries. The attacks on the railways and waterways affected the coal industry.

The destruction of railways and marshalling yards limited the movement of coal that was vital to the Reich. From October 1944 until February 1945, German coal reserves fell from 18 to 4.5 days. Attacks on the Cologne Bridge resulted in the interdiction of all water movements of coal to south Germany.⁵⁸ Attacks against the rail industry reduced the number of cars carrying coal from 21,000 per day in early 1944 to just 9,000 in early 1945. Coal supplies fell by 50 percent.⁵⁹ The attacks were so devastating that even locomotives lacked the coal to run much less to transport it around the country.⁶⁰ The coal industry suffered not because of direct attacks - it suffered due to secondary effects from attacks on railways and waterways.

The CBO proved so effective that it forced changes in both policy and strategy by German leaders. The CBO brought the fight to the German's doorstep and laid waste to much of the country. These efforts caused Hitler and his high command to divert resources, including people and war materials, from the frontlines to defend the homeland. The attacks on Germany's homeland infuriated Hitler so much that he wanted to enact revenge on the Allies. Hitler ordered the research and development of vengeance weapons or the V-weapons, V-1 and V-2 rockets.⁶¹ The effort put into the V-weapons programs equaled the required effort to produce 24,000 new fighters.⁶² The results of the V-weapons showed the effort put into the programs was just wasted effort. An increase in anti aircraft production versus aircraft production demonstrates another

mis-prioritized effort.⁶³ Production of 88mm shell became the highest priority. Estimates showed that it took approximately 16,000 shells to bring down one bomber.⁶⁴ During this time, the attrition rates of German aircraft increased higher than the capacity to replace them. Both of these diversions depleted economic resources the Germans needed to sustain the war effort on the frontlines. The German defense against the CBO contributed to the weakening of the front. In response to attacks, forces relocated back to Germany from frontline positions to provide defense and rebuild bombed industrial areas. Over two million soldiers and civilians provided anti aircraft defense; that is more personnel than what worked in the entire aircraft industry.⁶⁵ Another one million people engaged in repair and rebuilding of damaged facilities.⁶⁶ Large amounts of war materials were diverted to defend against the bombers of the CBO. 30 percent of all guns and 20 percent of all heavy munitions went directly to defending the homeland. The homeland had as many guns defending it as the troop on the entire eastern front had.⁶⁷ 50 percent of the electro-technical and 33 percent of the optical industries supported radar and communications stations were devoted to homeland defense.⁶⁸ Germany had almost 800 fighters stationed for defense against the CBO, but only had 475 to defend the entire eastern front.⁶⁹ All of the resources defending the homeland cost the frontline forces. The German war effort spiraled into failure while trying to defend against the CBO. The CBO did not defeat Germany alone, but it did set the conditions for allied victory.

Russia's 1944 offensive is one of the best examples on how the CBO set the conditions for success of Allied forces. The Germans feared the CBO so much they sacrificed many of their efforts on the eastern front to defend against it. The cost of trying to defend the homeland made the conditions in the east prime for the Russian offensive in June 1944. On the 22nd, the Russians began the Bagration offensive against Army Group Centre. The Germans did not have

a suitable air defense or forces required to mount a defense; they were defending the homeland. The Russian army had the support of 4,500 aircraft, 2,700 tanks, and 1,300 assault guns. The German force consisted of 775 aircraft, only a 100 were fighters and 50 of those moved back to Germany prior to the start of the battle.⁷⁰ The Russians maintained a six to one superiority in aircraft and a 46 to one (2,318 to 50) advantage in fighter aircraft.⁷¹ The lack of proper forces resulted in near total destruction of Army Group Centre and paved the way for the Russian push to Berlin. Army Group Centre lost 200,000 men and 900 tanks in the battle. The Russians destroyed two out of three panzer corps in the Third Panzer Army. Fourth Army was forced into a full retreat and lost 130,000 of 165,000 troops. During the first 12 days, Army Group Centre lost 25 divisions.⁷² The devastating losses inflicted on German forces defending the Eastern front can be directly linked to the effects of the CBO. Germany could not mount a credible defense because they lacked oil, aircraft, heavy guns, and forces. Either the CBO destroyed these items or it forced them into defense of the homeland taking them out of the frontline battle.

Many overlook the actual effectiveness of the Combined Bomber Offensive (CBO) because, as Richard Davis stated, “Strategic bombing failed to meet the most ambitious goal set for it by the very airmen who practiced it. Strategic bombing did not, as an independent force, bring about the defeat of Germany.”⁷³ One must understand that the CBO might have been able to produce a decisive victory, but no one should have expected it. Removing that bias allows the actual results of the CBO to prove its effectiveness. The CBO effectively destroyed the Luftwaffe, shut down the German transportation system, and shutdown their industry through direct attacks. The second and third order effects of these attacks removed a significant amount of resources from the frontlines, greatly reduced production of war materials, and hindered the conduct of war by denying critical resources such as oil and explosives.⁷⁴ Richard Overy may

have said it best, “directly or indirectly, bombing had wide-ranging and diverse effects on the German war effort which went well beyond the material damage to factories and infrastructure. Indeed, by 1944 bombing was the central issue on the German home front.”⁷⁵ What more could one realistically expect from the CBO? The CBO did not force Germany to surrender unconditionally by itself, but it was a critical factor in the defeat of the European Axis powers.

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- ¹ *United States Strategic Bombing Surveys*, 9.
- ² Ibid.
- ³ Davis, *Bombing the European Axis Powers*, 595.
- ⁴ Ibid.
- ⁵ *The United States Strategic Bombing Surveys*, 5.
- ⁶ *United States Strategic Bombing Surveys*, 6.
- ⁷ Murray, *Strategy for Defeat: The Luftwaffe 1933-1945*, 255.
- ⁸ Overy, "World War II: The Bombing of Germany." 112.
- ⁹ Murray, *Strategy for Defeat: The Luftwaffe 1933-1945*, 263.
- ¹⁰ Overy, "World War II: The Bombing of Germany." 112.
- ¹¹ Ibid.
- ¹² Overy, *Why the Allies Won*, 131.
- ¹³ Overy, *The Air War: 1939-1945*, 122.
- ¹⁴ Murray, *Strategy for Defeat: The Luftwaffe 1933-1945*, 277.
- ¹⁵ Davis, *Bombing the European Axis Powers*, 359.
- ¹⁶ Hansen, *Fire and Fury: The Allied Bombing of Germany 1942-1945*, 281.
- ¹⁷ Davis, *Bombing the European Axis Powers*, 594.
- ¹⁸ Overy, *The Air War: 1939-1945*, 124.
- ¹⁹ Overy, *Why the Allies Won*, 131.
- ²⁰ *The United States Strategic Bombing Surveys*, 21.
- ²¹ Ibid.
- ²² Ibid.
- ²³ Ibid, 22.
- ²⁴ Ibid, 22.
- ²⁵ Davis, *Bombing the European Axis Powers*, 359.
- ²⁶ Overy, *The Air War: 1939-1945*, 122.
- ²⁷ Overy, "World War II: The Bombing of Germany." 112.
- ²⁸ Davis, *Bombing the European Axis Powers*, 358.
- ²⁹ *The United States Strategic Bombing Surveys*, 21-27. Overy, *Why the Allies Won*, 125-129.
- ³⁰ *The United States Strategic Bombing Surveys*, 31.
- ³¹ Ibid, 30.
- ³² Ibid.
- ³³ Ibid.
- ³⁴ Overy, *The Air War: 1939-1945*, 124.
- ³⁵ *The United States Strategic Bombing Surveys*, 29.
- ³⁶ Ibid.
- ³⁷ Overy, "World War II: The Bombing of Germany." 112.
- ³⁸ Overy, *The Air War: 1939-1945*, 118, 123.
- ³⁹ *The United States Strategic Bombing Surveys*, 7.
- ⁴⁰ Overy, *The Air War: 1939-1945*, 123, 150.
- ⁴¹ Murray, *Strategy for Defeat: The Luftwaffe 1933-1945*, 309.
- ⁴² Overy, "World War II: The Bombing of Germany." 113.
- ⁴³ *The United States Strategic Bombing Surveys*, 32.
- ⁴⁴ Ibid.
- ⁴⁵ Murray, *Strategy for Defeat: The Luftwaffe 1933-1945*, 245.
- ⁴⁶ Ibid, 303.
- ⁴⁷ Ibid, 278.
- ⁴⁸ Ibid, 314.
- ⁴⁹ Ibid, 278.
- ⁵⁰ Ibid, 277.
- ⁵¹ *The United States Strategic Bombing Surveys*, 23.

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- ⁵² Ibid.
- ⁵³ Ibid.
- ⁵⁴ Ibid.
- ⁵⁵ Ibid.
- ⁵⁶ Ibid.
- ⁵⁷ Ibid, 25.
- ⁵⁸ Ibid, 33.
- ⁵⁹ Ibid.
- ⁶⁰ Ibid.
- ⁶¹ Overy, *The Air War: 1939-1945*, 123, 121.
- ⁶² Murray, *Strategy for Defeat: The Luftwaffe 1933-1945*, 300.
- ⁶³ Overy, *The Air War: 1939-1945*, 123, 121.
- ⁶⁴ Davis, *Bombing the European Axis Powers*, 594.
- ⁶⁵ Ibid.
- ⁶⁶ Ibid.
- ⁶⁷ Overy, *The Air War: 1939-1945*, 123, 122.
- ⁶⁸ Ibid.
- ⁶⁹ Murray, *Strategy for Defeat: The Luftwaffe 1933-1945*, 284.
- ⁷⁰ Murray, *Strategy for Defeat: The Luftwaffe 1933-1945*, 284. Keegan, *The Second World War*, 480.
- ⁷¹ Keegan, *The Second World War*, 480. Jordan, "Operation Bagration: Soviet Offensive of 1944"
- ⁷² Keegan, *The Second World War*, 481.
- ⁷³ Davis, *Bombing the European Axis Powers*, 594.
- ⁷⁴ Ibid, 595.
- ⁷⁵ Overy, "World War II: The Bombing of Germany." 111.

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